# How natural leather and  artificial leather are made ?

## 1. How natural leather is made ?

Natural leather is made by a multi-stage process that involves preserving and treating animal hides, which are a by-product of the meat and dairy industries. The process stabilizes the protein (collagen) structure of the hide to make it durable, flexible, and resistant to decomposition.

The key processes of leather making are:

**- Sourcing and Preparation:**

**1. Sourcing Raw Material:**

The process begins with obtaining animal hides, most commonly from cows, as a by-product that would otherwise go to waste.

**2. Curing:**

The fresh hides are preserved using salt or a salt solution to prevent bacterial growth and decay during transport and storage.

**3. Soaking and Liming (Beamhouse Operations):**

Hides are soaked in water to rehydrate them and remove salt, dirt, and soluble proteins.

They are then treated with a lime solution to remove hair and other keratinous matter and to "open up" the collagen fibers.

**4. Fleshing and Splitting:**

Any remaining flesh, fat, and tissue are mechanically scraped from the hide.

Thicker hides are then split into two layers:
the top layer for high-quality, full-grain leather, and the bottom layer (split) for suedes or lower-grade leathers.

**- Tanning and Finishing:**

**1. Tanning:**

This crucial step converts the perishable raw hide into stable leather. Tanning agents bind with the collagen proteins to prevent them from decomposing.

**- Common methods include:**

* Chrome Tanning:

The most common method, using chromium salts to produce a soft, supple, and pliable "wet blue" leather, often used for clothing and handbags.

* Vegetable Tanning:

An older method using natural tannins from plant sources like tree bark, resulting in a firmer, thicker, and typically brown leather used for items like belts and heavy-duty footwear.

**2. Retanning and Dyeing:**

After tanning, the leather is re-tanned with additional agents, fats, and oils to impart specific characteristics like softness, fullness, and water resistance. Dyes are applied to give the leather its desired color.

**3. Drying and Softening:**
Excess moisture is removed through various drying methods, such as vacuum or air drying. The leather is then mechanically softened in a staking machine or tumbled in drums (milling) to enhance its flexibility and natural grain.
**4. Finishing:**
The final stage involves applying surface coatings or treatments to minimize blemishes, achieve a desired gloss, and provide protection. This can include polishing, embossing patterns, or applying protective topcoats to meet specific product requirements.
**5. Final Inspection:**
The finished leather is inspected, measured, and graded for quality before being shipped to manufacturers to be made into final products.

**2. How artificial leather is made ?**
Artificial leather is typically made by applying a coating of a synthetic polymer, such as polyurethane (PU) or polyvinyl chloride (PVC), onto a fabric base (e.g., polyester or cotton).

The process generally involves coating, curing, and texturizing to mimic the look and feel of genuine leather.

The Standard Manufacturing Process (PU and PVC)

The most common manufacturing method involves

**- Several key steps:**

**1. Obtaining a Base Fabric:**

A woven or non-woven textile, usually made from polyester or cotton, is selected to provide strength and flexibility to the final product.

**2. Formulating the Plastic Coating:**

The polymer mixture is prepared.

For PVC, plasticizers are added to the rigid plastic to make it soft and flexible, along with stabilizers and pigments. For PU, a different chemical reaction involving isocyanates and polyols is used to create a flexible polymer.

**3. Binding the Materials:**

The liquid plastic mixture is applied to the base fabric. This can be done via processes like roller coating or using an embossed release paper as a mold for the surface finish. The layers are then bonded together using heat and pressure.

**4. Curing and Texturizing:**
The material is heated in an oven to cure the polymer and firmly bond the layers. While still warm or as a separate step, the surface is passed through textured rollers or the release paper is peeled away, which imprints an artificial grain pattern to resemble real leather.
**5. Finishing:**
Additional topcoats, dyes, and protective layers may be applied to achieve the desired color, sheen, durability, and resistance to scratches or UV light.

**- Alternative & Plant-Based Methods:**
Innovations in the field have led to alternatives that use fewer petroleum-based products. These plant-based leathers (often a subset of "vegan leather") use materials like:
**1. Cactus:**
Mature cactus pads are harvested, ground, sun-dried, and mixed with a bio-resin that is then coated onto a carrier fabric.

**2. Pineapple:**
Fibers extracted from pineapple leaves are felted into a mat, washed, and then combined with a resin (often partially PU) for durability.
**3. Mushroom:**
Mycelium, the root structure of fungi, is grown on an agricultural waste substrate, harvested, compressed, and processed into a leather-like material.
**4. Cork:**
Thin sheets of cork oak tree bark are adhered to a fabric backing, often using a natural adhesive called suberin.

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https://archive.org/details/@wazefapress

**Resources:**

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